

CLAIMS

I claim:

1. A method for purifying an inorganic halide or oxyhalide feed liquid, comprising contacting the feed liquid with a zeolite to produce a purified inorganic halide or oxyhalide liquid.
- 5
2. The method of Claim 1 wherein the zeolite is a type-Y zeolite in a hydrogen form.
3. The method of Claim 1 wherein the zeolite has a silica-to alumina ratio of at least about 5.
- 10 4. The method of Claim 1 wherein the zeolite contains a concentration of alkali or alkaline earth metal such that substantial contamination of the purified inorganic halide or oxyhalide liquid by the alkali or alkaline earth metal is prevented.
5. The method of Claim 1 wherein the zeolite contains less than about 3% by weight Na₂O.
- 15
6. The method of Claim 5 wherein the zeolite contains less than about 0.05% by weight Na₂O.
7. The method of Claim 1 wherein the zeolite includes zeolite particles greater than about 90 microns in size.
- 20 8. The method of Claim 7 wherein the zeolite includes zeolite particles greater than about 400 microns in size.

9. The method of Claim 1 wherein the zeolite has a silica-to-alumina ratio of at least about 5.
10. The method of Claim 9 wherein the zeolite has a silica-to-alumina ratio of at least about 80.
- 5 11. The method of Claim 1 wherein the zeolite has a mean pore size of about 20 to about 30 Angstroms.
12. The method of Claim 11 wherein the zeolite has a mean pore size of about 24 to about 26 Angstroms.
13. The method of Claim 1 wherein the zeolite is a type-Y zeolite in a hydrogen form and has a SiO₂-to-Al₂O₃ mole ratio of about 5.1, a Na₂O weight percent of about 2.8, a unit cell size of about 24.5 Angstroms and a BET surface area of about 730 m²/gram.
10 ;
14. The method of Claim 1 wherein the zeolite is a type-Y zeolite in a hydrogen form and has a SiO₂-to-Al₂O₃ mole ratio of about 80, a Na₂O weight percent of about 0.03, a unit cell size of about 24.2 Angstroms and a BET surface area of about 780 m²/gram.
15 ;
15. The method of Claim 1 wherein the zeolite has been heated under an inert atmosphere to remove volatile species present therein.
16. The method of Claim 15 wherein the zeolite has been heated to a
20 temperature of at least about 150°C under an inert atmosphere.
17. The method of Claim 1 wherein the inorganic halide or oxyhalide is selected from the group consisting of SiCl₄, GeCl₄ and POCl₃.

18. The method of Claim 1 wherein a metal impurity is removed from the feed liquid.
19. The method of Claim 18 wherein the metal impurity is a metal ion.
20. The method of Claim 18 wherein the metal impurity is selected from the group consisting of aluminum, antimony, barium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, sodium, strontium, tin and zinc.
5
21. The method of Claim 1 wherein a molecular impurity is removed from the feed liquid.
- 10 22. The method of Claim 21 wherein the molecular impurity contains a chemical bond selected from the group consisting of C-H, Si-H, Si-OH, O-H, C-O and H-Cl.
;
23. The method of Claim 1 wherein both metal impurities and molecular impurities are removed from the feed liquid.
- 15 24. The method of Claim 1 further comprising the step of contacting the feed liquid with silica gel.
25. The method of Claim 1 wherein the feed liquid is contacted with a mixture of at least one zeolite and silica gel.
26. The method of Claim 1 wherein the feed liquid is contacted with a mixture of two or more zeolites.
20
27. The method of Claim 1 wherein the feed liquid is contacted with the zeolite in a continuous process.

28. The method of Claim 1 wherein the zeolite is contained in a disposable liquid filtration housing.
29. An apparatus for purifying an inorganic halide or oxyhalide feed liquid, comprising:
 - 5 a) a liquid filtration housing including a liquid inlet and a liquid outlet; and
 - b) a type-Y zeolite in a hydrogen form.
30. The apparatus of Claim 29 further comprising a zeolite retention device.
31. The apparatus of Claim 29 wherein the liquid filtration housing is composed
10 of a chemical resistant material that is resistant to contaminating an inorganic halide or oxyhalide liquid.
32. The apparatus of Claim 29 wherein the zeolite has a silica-to alumina ratio of at least about 5.
33. The apparatus of Claim 29 wherein the zeolite contains a concentration of
15 alkali or alkaline earth metal such that substantial contamination of the purified inorganic halide or oxyhalide liquid by the alkali or alkaline earth metal is prevented.
34. The apparatus of Claim 29 wherein the zeolite contains less than about 3% by weight Na₂O.
- 20 35. The apparatus of Claim 34 wherein the zeolite contains less than about 0.05% by weight Na₂O.
36. The apparatus of Claim 29 wherein the zeolite includes zeolite particles greater than about 90 microns in size.

37. The apparatus of Claim 36 wherein the zeolite includes zeolite particles greater than about 400 microns in size.
38. The apparatus of Claim 29 wherein the zeolite has a silica-to-alumina ratio of at least about 5.
- 5 39. The apparatus of Claim 38 wherein the zeolite has a silica-to-alumina ratio of at least about 80.
40. The apparatus of Claim 29 wherein the zeolite has a mean pore size of about 20 to about 30 Angstroms.
41. The apparatus of Claim 40 wherein the zeolite has a mean pore size of about 10 24 to about 26 Angstroms.
42. The apparatus of Claim 29 wherein the zeolite has a SiO₂-to-Al₂O₃ mole ratio of about 5.1, a Na₂O weight percent of about 2.8, a unit cell size of about 24.5 Angstroms and a BET surface area of about 730 m²/gram.
43. The apparatus of Claim 29 wherein the zeolite has a SiO₂-to-Al₂O₃ mole 15 ratio of about 80, a Na₂O weight percent of about 0.03, a unit cell size of about 24.2 Angstroms and a BET surface area of about 780 m²/gram.
44. The apparatus of Claim 29 wherein the zeolite is substantially free of volatile species.
45. The apparatus of Claim 29 wherein the zeolite has been heated under an inert 20 atmosphere to remove volatile species present therein.
46. The apparatus of Claim 45 wherein the zeolite has been heated to a temperature of at least about 150°C under an inert atmosphere.

47. The apparatus of Claim 29 wherein the liquid filtration housing is disposable.
48. The apparatus of Claim 29 wherein the liquid filtration housing is composed of perfluoroalkoxy (PFA).
- 5 49. The apparatus of Claim 29 wherein the liquid filtration housing is composed of polytetrafluoroethylene (PTFE).
50. The apparatus of Claim 29 further comprising liquid conduit connecting the liquid filtration housing to a manufacturing process.
51. The apparatus of Claim 50 wherein the liquid conduit is composed of perfluoroalkoxy (PFA) or polytetrafluoroethylene (PTFE).

10